

REMARKS

Claims 1-20 and 31-45 are presently pending in the subject application. Claims 21-30 and 46-53 have been cancelled, and claim 3 has been amended to correct a minor issue. The amendment to claim 3 is not a narrowing amendment because it deletes a limitation of this claim.

In the Office Action mailed May 3, 2002, the Examiner rejected the claims as follows:

- (A) Claims 3 and 23 were rejected under 35 U.S.C. § 112, paragraph 2;
- (B) Claims 21-23 were rejected under 35 U.S.C. § 102 over Ueyama;
- (C) Claims 25-28 were rejected under 35 U.S.C. § 102 over Nam;
- (D) Claims 25-27 were rejected under 35 U.S.C. § 102 over Ueda;
- (E) Claims 1, 2, 4, 15, 16, 18, 19, 31, 35 and 40 were rejected under 35 U.S.C. § 103 over the combination of Akimoto and Miyamoto;
- (F) Claims 3, 14, 17, 31, 34, 35, 39, 40 and 44 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Skrobak;
- (G) Claims 5, 20 and 45 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Oda;
- (H) Claims 6-10, 16 and 41 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Olson;
- (I) Claim 11 was rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Lange;
- (J) Claims 12 and 13 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto, Lange and Olson;
- (K) Claim 24 was rejected under 35 U.S.C. § 103 over the combination of Ueyama and Nam;
- (L) Claims 29 and 30 were rejected under 35 U.S.C. § 103 over Nam;
- (M) Claim 30 was rejected under 35 U.S.C. § 103 over the combination of Ueda and Nam;
- (N) Claims 32, 33, 37, 38, 42 and 43 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Nam;

(O) Claims 46 and 50 were rejected under 35 U.S.C. § 103 over the combination of Ueyama and Miyamoto;

(P) Claim 47 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Olson;

(Q) Claims 48 and 49 were rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Nam;

(R) Claim 51 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Oda;

(S) Claim 52 was rejected under 35 U.S.C. § 103 over the combination of Ueda and Miyamoto; and

(T) Claim 53 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Ueda and Miyamoto.

A. Response to Section 112, Paragraph 2, Rejections

Claim 3 was rejected under Section 112, paragraph 2, on the grounds that the term "rotationally" in line 2 should be deleted. Although applicants disagree with the Examiner because the claim is not limited to the disclosed embodiments with respect to reference numbers 100 and 179, claim 3 has been amended to delete "rotationally" in line 2. Claim 3 is accordingly broader because it now includes both rotational and fixed connections.

Claim 23 was rejected under 35 U.S.C. § 112, second paragraph, on the grounds that it is unclear what structure comprises the "cap member." As set forth in the specification, the cap member is the element that spaces the first end effector above the first arm member. More specifically, the cap member is identified by reference number 546 (Figures 21 and 23) and described at pages 23 and 24. The feature of a cap member is accordingly fully supported and described in the specification. Therefore, claim 23 complies with Section 112, second paragraph, and this rejection should be withdrawn.

B. Response to Section 102 Rejection - Ueyama

Claims 21-23 were rejected under Section 102 over Ueyama. These claims have been cancelled, and thus this rejection should be withdrawn.

C. Response to Section 102 Rejection - Nam

Claims 25-28 were rejected under 35 U.S.C. § 102 over Nam. These claims have been cancelled, and thus this ground of rejection is now moot.

D. Response to Section 102 Rejection - Ueda

Claims 25-27 were rejected under 35 U.S.C. § 102 over Ueda. This rejection is also moot because claims 25-27 have been cancelled.

E. Response to Section 103 Rejection - Akimoto and Miyamoto

Claims 1, 2, 4, 15, 16, 18, 19, 31, 35 and 40 were rejected under 35 U.S.C. § 103 over the combination of Akimoto and Miyamoto. In rejecting these claims, Akimoto is cited for the proposition that it "teaches moving a housing along a rail and using a vertically extendable and rotatable vertical member to support an arm arrangement." Miyamoto is cited for the proposition that it "teaches rotating an end effector about a horizontal axis at the end of an arm." Based upon these assertions, the Examiner concludes "It would have been obvious to substitute an arm as taught by Miyamoto for the arm arrangement in Akimoto if desiring to move and invert wafers one at a time." For the reasons explained below, however, there is no motivation to move and invert wafers one at a time in Akimoto's device.

Independent claims 1, 15, 31, 35 and 40 are patentable under Section 103 because it is improper to combine Akimoto and Miyamoto to come up with the claimed combination of elements. More specifically, modifying Akimoto to have an arm as taught by Miyamoto would result in a dysfunctional device that would likely damage wafers in a typical operation. To better understand this, it is helpful to look at the purpose of Akimoto and how the components in Akimoto are arranged to meet this purpose.

Akimoto is directed toward a single robot that has two arms in a minimal amount of space. Akimoto states that one problem of the prior art is that transfer mechanisms individually load and unload workpieces in processing stations. As a result, the handling devices for workpieces are complex, large and inefficient. (Akimoto, col. 1, lines 27-34.) To resolve this problem with the prior art, Akimoto teaches an apparatus having a transfer robot that includes a first handler for transferring the substrate into or out from a storage container, and a second handler for transferring the substrate into and out from a

processing unit. The first handler can transfer the substrate from the container to either a transfer table or directly to the second handler. Referring to Figure 3, Akimoto more specifically teaches a transfer unit that has an arm 35 that removes the workpiece from the container, and two forks 36 and 37. The forks 36 and 37 are used to insert or remove wafers from processing stations. In all of the embodiments disclosed in Akimoto, the arm and the forks are spaced closely together in a vertical arrangement to reduce the height occupied by the device and to reduce the vertical movement required to handle workpieces.

Miyamoto merely discloses a semiconductor wafer loading/unloading apparatus that has a single arm attached to a rotary base. The arm has an end effector that can rotate around a horizontal axis. Miyamoto does not disclose a device having a plurality of arms as set forth in Akimoto.

Akimoto and the prior art teach away from modifying Akimoto to accommodate the arm of Miyamoto. As set forth in Akimoto, it is desirable to decrease the size of the robot to efficiently use the space within a processing tool. (Akimoto, col. 1, lines 38-42.) However, if Miyamoto's arm is combined with Akimoto's robot to move and invert wafers, then it will be appreciated that Akimoto would need to be modified by increasing the vertical spacing between its arm and forks to separate these components by at least the radius of the workpiece. In the case of a 200 mm workpiece, this would result in a significant increase in the vertical dimension of Akimoto's robot. Of course this increase in vertical dimension is only exacerbated for 300 mm workpieces. Such an increase in size of Akimoto's workpiece to accommodate Miyamoto's arm not only directly conflicts with Akimoto's purpose of decreasing the size to efficiently use the space in a tool, but it also increases the distance that the robot must move vertically so that Akimoto's arm can access the storage containers and Akimoto's forks can access the processing stations. This would decrease the efficiency of the unit because it takes longer to travel the increased distance and increases the likelihood that components of the robot will suffer from mechanical wear. It follows, therefore, that modifying Akimoto to use Miyamoto's arm is in direct opposition with the teachings of the prior art. Thus, there is no motivation to combine Akimoto with Miyamoto to come up with the claimed combinations of elements.

In summary, claims 1, 15, 31, 35 and 40 are patentable over the combination of Akimoto and Miyamoto because it is improper to combine these references to come up

with the claimed combination of elements for the reasons set forth above. Additionally, claims 2, 4, 16, 18 and 19 are patentable over the combination of Akimoto and Miyamoto as depending from either independent claim 1 or 15, and also because these dependent claims recite additional features.

F. Response to Section 103 Rejection - Akimoto, Miyamoto and Skrobak

Claims 3, 14, 17, 31, 34, 35, 39, 40 and 44 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Skrobak. In rejecting these claims, Akimoto and Miyamoto are cited as set forth above with respect to the previous grounds of rejection. Skrobak is cited for the proposition that it would have been obvious to use an articulated arm in lieu of the arm arrangement in Akimoto. Skrobak, however, does not overcome the shortcomings that it is improper to combine Akimoto with Miyamoto. Therefore, claims 3, 14, 17, 31, 34, 35, 39, 40 and 44 are patentable over the combination of Akimoto, Miyamoto and Skrobak for the reasons explained above in Section E above.

G. Response to Section 103 Rejection - Akimoto, Miyamoto and Oda

Claims 5, 20 and 45 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Oda. Akimoto and Miyamoto are cited for the proposition set forth above in Section E, and Oda is cited for the proposition that it would have been obvious to substitute a track for the screw drive set forth in Akimoto. Oda completely fails to set forth anything with respect to the other features of these claims, and Oda does not overcome the failings of combining Akimoto and Miyamoto to come up with the claimed combination of elements. Therefore, claims 5, 20 and 45 are patentable for the reasons explained above in Section E.

H. Response to Section 103 Rejection - Akimoto, Miyamoto and Olson

Claims 6-10, 16 and 41 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Olson. Olson is cited for the proposition that it would have been obvious to use a gripper in lieu of a vacuum. Olson fails to overcome the shortcomings of combining Akimoto and Miyamoto as explained above. Therefore, claims 6-10, 16 and 41 are patentable over this combination of references for the reasons explained above set forth in Section E.

I. Response to Section 103 Rejection - Akimoto, Miyamoto and Lange

Claim 11 was rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Lange on the grounds that it would have been obvious to use a sensor as taught in Lange. Lange fails to overcome the shortcomings of combining Akimoto and Miyamoto as explained above. For the reasons explained above in Section E, claim 11 is patentable over the combination of Akimoto, Miyamoto and Lange.

J. Response to Section 103 Rejection - Akimoto, Miyamoto, Lange and Olson

Claims 12 and 13 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto, Lange and Olson. For the reasons explained above in Section E, Lange and Olson do not overcome the shortcomings of combining Akimoto with Miyamoto. Therefore, claims 12 and 13 are also patentable over this combination of references.

K. Response to Section 103 Rejection - Ueyama and Nam

Claim 24 was rejected under 35 U.S.C. § 103 over the combination of Ueyama and Nam. This claim has been cancelled, and thus this rejection should be withdrawn.

L. Response to Section 103 Rejection - Nam

Claims 29 and 30 were rejected under 35 U.S.C. § 103 over Nam. These claims have been cancelled, and thus this rejection should be withdrawn.

M. Response to Section 103 Rejection - Ueda and Nam

Claim 30 was rejected under 35 U.S.C. § 103 over the combination of Ueda and Nam. This claim has been cancelled, and thus this rejection should be withdrawn.

N. Response to Section 103 Rejection - Akimoto, Miyamoto and Nam

Claims 32, 33, 37, 38, 42 and 43 were rejected under 35 U.S.C. § 103 over the combination of Akimoto, Miyamoto and Nam. Akimoto and Miyamoto are cited as applied above with respect to claim 31 in Section E. Nam is cited for the proposition that it would have been obvious to have used a paddle as taught in Nam. Nam fails to overcome the shortcomings of combining Akimoto and Miyamoto to come up with the claimed combination of elements. Therefore, for the reasons explained above with respect to Section E, claims 32, 33, 37, 38, 42 and 43 are patentable over the combination of Akimoto, Miyamoto and Nam.

O. Response to Section 103 Rejection - Ueyama and Miyamoto

Claims 46 and 50 were rejected under 35 U.S.C. § 103 over the combination of Ueyama and Miyamoto. These claims have been cancelled, and thus this rejection should be withdrawn.

P. Response to Section 103 Rejection - Ueyama, Miyamoto and Olson

Claim 47 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Olson. This claim has been cancelled, and thus this rejection should be withdrawn.

Q. Response to Section 103 Rejection - Ueyama, Miyamoto and Nam

Claims 48 and 49 were rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Nam. These claims have been cancelled, and thus this rejection should be withdrawn.

R. Response to Section 103 Rejection - Ueyama, Miyamoto and Oda

Claim 51 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Miyamoto and Oda. This claim has been cancelled, and thus this rejection should be withdrawn.

S. Response to Section 103 Rejection - Ueda and Miyamoto

Claim 52 was rejected under 35 U.S.C. § 103 over the combination of Ueda and Miyamoto. This claim has also been cancelled, and thus this rejection is also moot.

T. Response to Section 103 Rejection - Ueyama, Ueda and Miyamoto

Claim 53 was rejected under 35 U.S.C. § 103 over the combination of Ueyama, Ueda and Miyamoto. This claim has been cancelled, and thus this rejection should be withdrawn.

In light of the foregoing amendments and remarks, all of the pending claims are in condition for allowance. Applicants, therefore, request reconsideration of the application and allowance of all pending claims. If the Examiner wishes to discuss the above-noted distinctions between the claims and the cited references, or any other distinctions, the Examiner is encouraged to contact Paul Parker by telephone at (206) 287-3258.

Respectfully submitted,
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Enclosures:

Postcard
PTO-1083 (+ copy)
Appendix (Marked-up version of claims)

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Appendix – Claims
Marked to Show Changes

3. (Amended) The transport unit according to claim 2, wherein said arm member includes a first section and a second section, said first section ~~rotationally~~ carried by said vertical member at a first end thereof, and said first section rotationally carrying said second section at a second end thereof, said second section carrying said end effector, and wherein said transport unit further includes a third rotary actuator connected to said first and second sections for rotating said second section with respect to said first section about a second vertical axis.